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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte DANIELE FAUROUX*

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Appeal 2009-013489  
Application 10/572,668  
Technology Center 1600

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Decided: June 1, 2010

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Before TONI R. SCHEINER, LORA M. GREEN, and  
JEFFREY N. FREDMAN, *Administrative Patent Judges*.

FREDMAN, *Administrative Patent Judge*.

**DECISION ON APPEAL**

This is an appeal under 35 U.S.C. § 134 involving claims to methods for producing carbon monoxide by cryogenic distillation. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

*Statement of the Case*

*The Claims*

Claims 9-12 are on appeal. Claim 9 is representative and reads as follows:

9. A method for producing carbon monoxide by cryogenic distillation comprising the following steps:
- a) a gas mixture containing carbon monoxide, hydrogen and nitrogen is cooled and partially condensed to produce a cooled and partially condensed gas mixture;
  - b) the cooled and partially condensed gas mixture is separated to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid;
  - c) a stream of the carbon monoxide-enriched liquid is sent to a stripping column to produce hydrogen-free liquid carbon monoxide and hydrogen-enriched carbon monoxide gas;
  - d) a stream of the hydrogen-free carbon monoxide is sent to a first intermediate level of a distillation column;
  - e) a liquid stream, richer in methane compared to the stream feeding to the distillation column, is withdrawn from the bottom of the distillation column;
  - f) a carbon monoxide-rich stream is withdrawn from a second intermediate point, the second intermediate point being above the first intermediate point; and
  - g) a stream, enriched with nitrogen and optionally hydrogen compared to the stream feeding to the distillation column, is withdrawn from the top of the distillation column.

*The prior art*

The Examiner relies on the following prior art reference to show unpatentability:

Fabian DE 19541339 May 7, 1997

*The issue*

The Examiner rejected claims 9-12 under 35 U.S.C. § 103(a) as obvious over Fabian (Ans. 3-4).

The Examiner finds that the “difference between Fabian and the claimed invention is that the instant claims only utilize one rectification column, whereas the Fabian’s process utilizes more than one rectification column” (*id.* at 4). The Examiner concludes that “it is well within the purview of one ordinary skill in the art to modify the number of rectification column, in order to reduce the capital costs and still obtaining high purity of carbon monoxide” (*id.*).

Appellant argues that Fabian “teaches removing the nitrogen-rich fraction at an intermediate step to the removal of the carbon monoxide” (App. Br. 11). Appellant argues that this is “in contradistinction with the requirement of claim 9 of the present invention, which requires the carbon monoxide rich stream to be removed at an intermediate point and the nitrogen enriched stream to be removed at the top of the distillation column” (*id.*). Appellant also argues that “[o]ne skilled in this art would recognize that it would be very difficult, possibly impossible, to collapse these two rectification columns, with all the intermediate exchanges of heat, into a single column and retain the same product purity” (*id.*).

In view of these conflicting positions, we frame the obviousness issue before us as follows:

Does the evidence of record support the Examiner’s conclusion that claim 9 would have been obvious to the ordinary artisan over the teachings of Fabian?

*Findings of Fact*

1. Fabian teaches:

A method for obtaining carbon monoxide from a nitrogen-contaminated gas stream that essentially contains hydrogen, carbon monoxide and methane, in which

- a) the gas stream is cooled and partially condensed,
- b) the first hydrogen-rich fraction that accumulates in the partial condensation is removed,
- c) the carbon monoxide-rich condensate, which contains methane and nitrogen and is obtained in the partial condensation is sent to a hydrogen stripping column,
- d) in said column, separation into a second hydrogen-rich fraction and another carbon monoxide-rich fraction takes place, and
- e) said carbon monoxide-rich fraction containing methane and nitrogen is separated at low temperature into a highly pure carbon monoxide fraction and a fraction essentially containing methane and nitrogen characterized by the fact that
- f) the carbon monoxide-rich fraction that contains methane and nitrogen coming from the hydrogen stripping column is sent to a first rectification column,
- g) in said rectification column, a separation into a nitrogen-rich and a carbon monoxide-rich fraction containing methane takes place,
- h) the nitrogen-rich fraction is withdrawn,
- i) the carbon monoxide-rich fraction containing methane is sent to a second rectification column, and
- k) in said rectification column, a separation into the highly pure carbon monoxide product fraction and into a fraction essentially containing methane takes place.

(Fabian Trans. 16-17, Claim 1.)

2. Fabian teaches, “[v]arious possibilities for solving the problems that are caused by nitrogen are known” (Fabian trans. 3).

3. Fabian teaches that while “integration of a nitrogen/carbon monoxide separation . . . involves considerable additional costs . . . Compared to an otherwise necessary nitrogen separation . . . this solution nevertheless is in many cases the more profitable and simpler, if the nitrogen content in the carbon monoxide product must be limited” (Fabian trans. 4).

4. The Examiner finds that “‘comprising’ does not limit the number of rectification [columns] to only one column” (Ans. 5).

5. The Examiner “notes the differences with respect to [the] location of [the] withdrawing carbon monoxide-rich stream and carbon dioxide. However theses [sic] differences are not patentably distinct in the absence of unexpected results” (Ans. 4).

#### *Principles of Law*

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). “If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *Id.* at 417. Moreover, an “[e]xpress suggestion to substitute one equivalent for another need not be present to render such substitution obvious.” *In re Fout*, 675 F.2d 297, 301 (CCPA 1982).

As noted by the Court in *KSR*, “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” 550 U.S. at 421.

#### *Analysis*

Appellant argues that Fabian “teaches removing the nitrogen-rich fraction at an intermediate step to the removal of the carbon monoxide” (App. Br. 11). Appellant argues that this is “in contradistinction with the

requirement of claim 9 of the present invention, which requires the carbon monoxide rich stream to be removed at an intermediate point and the nitrogen enriched stream to be removed at the top of the distillation column” (App. Br. 11). Appellant argues that the “skilled artisan would find that not only does Fabin [sic Fabian] ‘339 not render the instant invention obvious, but actually teaches away from the instant invention” (*id.*).

The Examiner “notes the differences with respect to location of withdrawing carbon monoxide-rich stream and carbon dioxide. However theses differences are not patentably distinct in the absence of unexpected results” (Ans. 4).

We find that the Examiner has the better position. As noted by the Court in *KSR*, “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” 550 U.S. at 421. Here, as the Examiner finds (FF 5), the ordinary artisan would reasonably understand that modifying the location at which the carbon monoxide stream is withdrawn represents a tradeoff of purity for cost and effort. As Fabian teaches, “[v]arious possibilities for solving the problems that are caused by nitrogen are known” (Fabian trans. 3; FF 2). Fabian teaches that while “integration of a nitrogen/carbon monoxide separation. . . involves considerable additional costs . . . Compared to an otherwise necessary nitrogen separation . . . this solution nevertheless is in many cases the more profitable and simpler, if the nitrogen content in the carbon monoxide product must be limited” (Fabian trans. 4; FF 3).

Appellant does not provide any evidence that selection of the carbon monoxide removal point is unpredictable or results in an unexpected result.

Selection of the optimal level of carbon monoxide purification in Fabian’s rectification columns is merely a “predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417.

We also are not persuaded that Fabian teaches away from the claimed method in teaching a particular mode of carbon monoxide purification (FF 1-3). Like our appellate reviewing court, “[w]e will not read into a reference a teaching away from a process where no such language exists.” *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006).

Appellant also argues that “[o]ne skilled in this art would recognize that it would be very difficult, possibly impossible, to collapse these two rectification columns, with all the intermediate exchanges of heat, into a single column and retain the same product purity” (App. Br. 11).

However, as the Examiner correctly notes, Appellant’s Claim 9 uses the open transitional phrase “comprising” and contains no language which excludes the use of multiple rectification columns (*see* Claim 9). *See Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997) (“Comprising” is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.”)

Appellant argues that it “is well known to the skilled artisan that a multiple distillation column system, such as disclosed by Fabian, will produce streams of higher purity products than a single distillation column with an intermediate withdrawal, such as in the instant application” (Reply Br. 2). Appellant argues that “in the instant application, the carbon

monoxide-rich stream 29 is indicated to have a purity of 98.5% CO . . . In contrast, the equivalent highly pure carbon monoxide stream 16 in Fabian, is indicated to have a purity of 99.9% CO" (Reply Br. 2).

In our opinion, this argument sums up the Examiner's obviousness case. Appellant acknowledges that the skilled artisan would appreciate that increasing the number of distillation columns would predictably result in increased purity of carbon monoxide (*id.*) with the obvious corollary that reducing the number of distillation columns would reduce the purity of carbon monoxide. Appellant points to evidence that Fabian's multiple columns result in a purer product than that of the claimed system (*id.*).

We conclude that it would have been predictable, and consequently obvious, to reduce the number of columns in order to reduce the cost and complexity of the carbon monoxide purification process (*see, e.g.*, FF 2-5). The skilled artisan would have recognized the tradeoff between cost and the level of carbon monoxide purification as expressly recognized by Fabian who teaches that while "[i]ntegration of a nitrogen/carbon monoxide separation . . . involves considerable additional costs . . . Compared to an otherwise necessary nitrogen separation . . . this solution nevertheless is in many cases the more profitable and simpler, if the nitrogen content in the carbon monoxide product must be limited" (Fabian trans. 4; FF 3).

#### *Conclusion of Law*

The evidence of record supports the Examiner's conclusion that claim 9 would have been obvious to the ordinary artisan over the teachings of Fabian.

## SUMMARY

In summary, we affirm the rejection of claim 9 under 35 U.S.C. § 103(a) as obvious over Fabian. Pursuant to 37 C.F.R. § 41.37(c)(1)(vii)(2006), we also affirm the rejection of claims 10-12 as these claims were not argued separately.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

cdc

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